DOCUMENT RESUME

ED 416 832 IR 018 729

AUTHOR Elwell, John
TITLE Creating Computer Literate Teachers in a Foreign International School Via Individualized Instruction.
PUB DATE 1997-07-21
NOTE 91p.; Master's Practicum, Nova Southeastern University.
PUB TYPE Dissertations/Theses - Practicum Papers (043)
EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS Computer Anxiety; *Computer Attitudes; *Computer Literacy; Computer Uses in Education; *Educational Technology; Elementary Secondary Education; Foreign Countries; *Individual Instruction; Inservice Teacher Education; Teacher Attitudes; Teacher Improvement; Teacher Surveys; Training Methods
IDENTIFIERS Computer Coordinators; International Schools; Spain

ABSTRACT

This practicum paper describes a program implemented at an international school in Spain. The program's objectives were to create positive attitudes concerning technology, increase the participants' computer knowledge and usage, and decrease the amount of time the school's computer coordinator spent solving computer related problems. The target group consisted of 14 teachers who attended three instructional modules over the course of 12 weeks. The primary mode of instruction was individualized training, though the first module also included lectures and discussions. The administration of a computer survey before and after the implementation was one of the methods used to judge the program's degree of success. A review of the computer coordinator's logs, personal interviews with the participants, weekly reviews of session logs, and a program evaluation were also utilized to assess the effects of the program. All of the program's objectives were met with 100% of the target teachers satisfactorily improving their attitudes, knowledge, and usage. The computer coordinator's problem-solving time decreased dramatically. Appendices include: a computer survey; the computer coordinator log - (pre-implementation); a session log; the computer coordinator log - (post-implementation); an individual program goals form; a permission release form; a computer in-service program evaluation questionnaire; and frequency of computer survey responses charts. (Contains 17 references.) (Author/JAK)

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CREATING COMPUTER LITERATE TEACHERS IN A FOREIGN INTERNATIONAL SCHOOL VIA INDIVIDUALIZED INSTRUCTION

by

John Elwell

A Final Report submitted to the Faculty of the Fischler Center for the Advancement of Education of Nova Southeastern University in partial fulfillment of the requirements for the degree of Master of Science

The abstract of this report may be placed in the University database system for reference

July 21, 1997

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Abstract

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Elwell, John T., 1997. Practicum Report, Nova Southeastern University, Fischler Center for the Advancement of Education.
Descriptors: Educational Technology / Computer Anxiety / Computer Literacy / Computer Uses in Education / Teacher Improvement / Teacher Attitudes / In-Service Teacher Education / Training Methods / Computer Uses in Education / Individual Instruction

This program took place at an international school in Spain. The program's objectives were to create positive attitudes concerning technology, increase the participants' computer knowledge and usage, and decrease the amount of time the school's computer coordinator spent solving computer related problems. The target group consisted of 14 teachers who attended three instructional modules over the course of 12 weeks. The primary mode of instruction was individualized training, though the first module also included lectures and discussions. The administration of a computer survey before and after the implementation was one of the methods used to judge the program's degree of success. A review of the computer coordinator's logs, personal interviews with the participants, weekly reviews of session logs, and a program evaluation were also utilized to assess the effects of the program. All of the program's objectives were met with 100 percent of the target teachers satisfactorily improving their attitudes, knowledge, and usage. The computer coordinator's problem-solving time decreased dramatically. Appendices include a computer survey, a chart showing the frequency of the computer survey responses, a chart showing the range of the computer survey scores, the computer coordinator's weekly logs, a permission release form, an individual program goals form, a session log form, and a computer in-service program evaluation.

Authorship Statement

I hereby testify that this paper and the work it reports are entirely my own. When it has been necessary to draw from the work of others, published or unpublished, I have acknowledged such work in accordance with accepted scholarly and editorial practice. I give this testimony freely, out of respect for the scholarship of other professionals in the field and in the hope that my own work, presented here, will earn similar respect.

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Practicum Title "Creating Computer Literate Teachers in a Foreign International School Via Individualized Instruction"

Student's Name John Elwell Completion date June, 1997

Project Site American School of Bilbao Berango, Spain

Mentor's Name Terry Orueta (print) T. Orueta (signature)

Mentor's position at the site Director Phone # 34-4-668-0860

Comment on impact of the project (handwritten):

John Elwell had correctly concluded that a number of our staff members needed one-on-one training in areas of their own interest in order for them to progress in their computer literacy. His individualized training has been very successful. Teachers have gained confidence and experience. I believe that this project will make a big difference in the use of technology at our school. We are very grateful to John for choosing and implementing his project with us.

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CHAPTER I

Purpose

The school involved in this practicum project is located on the northern coast of Spain in the province of Vizcaya. The school was founded as a private non-profit institution in 1967 to serve a sizable American community that existed there. In the early 1980´s, American businessmen were targeted by Basque terrorists, and as a result, most of the Americans left the area. In an effort to keep the school functioning, local students were recruited to fill the vacancies. Eighty-five percent of the school´s current student population consists of local Spanish citizens with American, Russian, British, Irish, Swedish, Israeli, Canadian, and Japanese pupils making up the remainder.

In 1996 the school had an enrollment of 276 students. Most of the students attend the school in order to become fluent in English. They usually enter at the age of two and remain in the school until the tenth grade, the last level of instruction offered at the school. There is only one class per grade level, and class sizes vary from 11 to 25 students. In addition to regular classroom instruction students participate in physical education, art, library, music, and Spanish language classes. In grades nine and 10, classes in Euskera, the local Basque language, are offered. When students leave the school they usually enroll in local public or private high schools. The language of instruction at the school is English.

The school is incorporated in Spain and is governed by an eight-member school board. Four of the board's members are elected by the parents of the students, and four are elected by the members of each current board. School board meetings are held on a monthly basis. A teacher representative is allowed to attend all board meetings. A parent-teacher organization also exists that makes non-binding recommendations to the board.

The school is accredited by the New England Association of Schools and Colleges, and the European Council of International Schools. The most recent visit by teams from both of these organizations took place in the spring of 1996. Studies at the school are also accepted by the Spanish Ministry of Education.

During the 1996-97 school year, tuitions at the school ranged from $3,000 to $4,150. Although in the past the school received some funding from the United States government, this was discontinued when the local American consulate was permanently closed. Except for occasional educational grants, no funds are provided by the Spanish government. In general, the tuition fees of the students are the only sources of income at the school.

The school employs 21 teachers from the United States, England, and Spain. Bachelor's degrees are held by 13 of the teachers, Master's degrees are held by seven, and one of the teachers has no degree. For an international school, the staff turnover at the school is quite low, with an average of one new teacher being hired in each of the past five years. New teachers are normally recruited in the United States or Great Britain.

In recent years, the school made a determined effort to provide its students with adequate access to the latest technological advances. In 1993 a technology committee was formed. It oversaw the purchase of over $150,000 in computer hardware and software. However, no funds had been spent directly on teacher technology training prior to the implementation of the author's program.

At the target school there are 40 computers. Eighteen of these are located in the computer lab. The library has four computers that are used for keeping records, accessing compact disk read-only-memory (CD-rom) reference materials, and linking to external sites via the Internet. Each of the eight administrative offices has its own computer, and two are also located in the teachers' workroom. Each classroom from prekindergarten to the fifth grade has a computer for use by the teacher and the students. Most of the teachers in these classes utilized this equipment to reinforce basic skills instruction with little or no modification of the programs' default settings in order to individualize the activities. The students in the sixth through the tenth grades normally utilize the equipment in the computer lab or the library for computer skills instruction and research. Every computer in the school has a printer, and a variety of peripheral equipment such as scanners, digital cameras, CD-roms, and modems are available for teacher and student use. Staff members are allowed to take school computer equipment to their homes when school is not in session, but since none of the computers is truly portable, this is seldom done. Prior to the program's implementation the school's director usually purchased all of the school's software. Software ratings

published in professional periodicals were used as a basis for making purchases. Teachers were allowed to suggest programs that they would like tc use. In most cases, only one copy of each program was purchased. Copyright infringement was common.

Computer in-service programs at the school had been very limited. The only strategy that had been used was that of mandatory attendance at large-group sessions with an instructor lecturing to the staff. Few opportunities for hands-on activities or follow-up support were provided. The goals of the classes were generally to demonstrate what one could do with technology, but not necessarily how one would go about actually doing it. The need for an in-service workshop had always been determined by the director of the school, with little input from staff members regarding their needs or interests. As a consequence, there was little interest in group workshops, and the majority of the faculty never used the skills that the instructor attempted to present. The last such workshop took place nearly three years ago.

The five male staff members, who are considered to be proficient in the use of technology, had trained themselves at home using their personal computers. These teachers often exchanged information among themselves concerning the school's hardware and software. They seldom attempted to transfer this knowledge to the other staff members due to time constraints and the low computer literacy level of the rest of the faculty. However, these teachers were often called upon to solve the computer-related problems of the other teachers. These problems were usually very simple in nature, such as connecting cables,

installing software, changing the configurations of programs, and correcting problems caused by a lack of computer training. The experienced teachers seldom had to ask for assistance when they had problems.

The author of this project was hired by the school in August of 1990 to serve as a third grade teacher in a self-contained classroom. This job placement has remained unchanged throughout the author's tenure at the school. Starting in 1991, the author assumed the role of an unofficial computer coordinator for the elementary grades. This post was made official by the school's director in 1995. The author was relieved of most non-teaching duties in order to have sufficient time to assist the elementary teachers with their computer-related problems. The author is also a member of the school's technology committee which meets on a monthly basis to deal with the overall technology needs of the school. All members of the faculty consider the author to be a member of the group of computer literate teachers.

The majority of the school's teachers were not proficient computer users. Except for five male teachers who had taught themselves how the systems work, the faculty was largely computer illiterate. This lack of proficiency had resulted in the limited utilization of computers in the classrooms, the avoidance of computer usage for completing personal and professional tasks, and the inability of a majority of the staff to find solutions to computer-related problems. It had also made many of them fearful that the systems were too difficult for them to ever master, and that they were being left behind by the rapid emergence of new technology.

Only a few computer in-service workshops had attempted to resolve this situation in the past. These were consistently ineffective and inefficient.

The target group was composed of 14 female teachers. After completing the pre-implementation computer survey, one male teacher chose not to participate in the training program. The remaining five male teachers were members of the computer-proficient group. The ages of the members of the target group ranged from 27 to 53 years, with a mean age of 41.2 years. Eight held Bachelor's degrees, five held Master's degrees, and one had no degree. The participants' years of teaching experience ranged from two to 25 years, with a mean of 13.9 years. Three nationalities were present in the target group with eight American, four Spanish and two British citizens taking part.

Thirty-eight percent of the targeted teachers graduated before 1990 and received little or no formal computer training during their university studies. This probably contributed greatly to the target group's lack of computer knowledge. It is possible that the school's location in Spain also aggravated the situation since the presence of computers in homes and schools is a much more recent development here than it is in the United States. The lack of an effective in-service program was also a relevant factor.

All teachers at the school completed a five-point Likert-scaled computer survey (Appendix A, p. 62) that was created by the author. The survey consisted of 20 items, with negative statements interspersed throughout the instrument. The first six items attempted to discern what attitudes the teachers had toward technology in general. The last 14

survey items focused on the teachers' perceptions of their own computer abilities and their utilization of computers. Fifteen of the 21 participants received average scores of three or higher on the attitudinal section of the survey (See Table 1: p. 8). It is desirable that all teachers at the school have a positive attitude toward computers and technology in general. An average score of less than three indicated the presence of a negative attitude concerning these areas. There was a discrepancy of six teachers whose low scores indicated that they did not have positive attitudes concerning computers and technology.

On the section of the survey that focused on knowledge and usage, six of the 21 teachers received scores of three or higher (See Table 1: p. 8). An average score of less than three indicated a negative perception of a teacher's computer usage and knowledge. There was a discrepancy of 15 teachers whose low scores did not indicate sufficient computer knowledge or frequency of use.

In his role as a computer coordinator, the author had observed that the targeted teachers seemed unable to solve simple computer problems or to understand basic explanations. This appeared to substantiate the results of the survey .

A second indicator that a problem existed at the school was the amount of time the author, in his role as a computer coordinator, spent assisting the members of the target group. The school provided 30 minutes of release time each week that was to be devoted to helping the teachers with computer-related problems. The author kept a log (Appendix B, p. 65) of the time spent on this activity. During the first two

Table 1

Range of Computer Survey Scores

Pre-Implementation

Attitude	Knowledge/ Utilization
2.33	1.21
2.50	1.36
2.50	1.71
2.67	1.86
2.83	2.07
Target Group ↑ 2.84	2.07
3.00	2.14
3.00	2.15
3.17	2.29
3.33	2.50
3.33	2.63̇
3.33	2.64
3.33	2.83
3.33	2.83
3.33	2.93 ↑ Target Group
3.50	3.00
4.17	3.36
4.20	4.00
4.33	4.21
4.50	4.36
4.67	4.92

Scores were ranked from the lowest to the highest on this table, not by specific teachers. That is to say, the participant whose score is the first one on the attitudinal section is not necessarily the person whose score is first on the knowledge/utilization section.

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months of the 1996-97 academic year, an average of 92 minutes per week was spent solving the computer problems of colleagues. Most of these problems were simple in nature. The majority consisted of installing new software, connecting cables, reconfiguring software, and utilizing the most basic functions of the programs. Most persons who had just a basic knowledge of computer systems should have been able to perform these functions with little or no assistance. An average of 30 minutes per week should have been sufficient to resolve the few complicated problems that required the attention of a computer coordinator with more training and experience. There was a discrepancy of 62 minutes per week that the author spent solving problems that most computer literate persons should have been able to solve for themselves.

In a world that is becoming more and more based on technology, it is critical that students receive competent computer instruction. In today's world many adults are bewildered by the simple tasks of programming a video cassette recorder and a microwave oven. Therefore, it is imperative that teachers be able to prepare the next generation of students so that they will not only be able to understand and utilize technology well, but so that they will also approach new technological advances with a sense of confidence.

Most parents want their children to receive effective computer training. In a survey conducted at the target school in the fall of 1996, 85 percent of the parents indicated that they felt that computer instruction was a vital part of the school's curriculum (Orueta, 1997). The author also surveyed the students at the school and discovered that 75 percent of them had

computers in their homes. The author noted that during parent conferences the parents were very interested in knowing how computers were used in the class, and if their children had sufficient access to these materials. They often asked for advice concerning software and hardware purchases.

To create computer literate students it is necessary to have a faculty that is computer literate. As shown by the author's computer survey (Appendix A, p. 62), a majority of the teachers at the school did not feel that they had sufficient computer skills to be able to instruct their students effectively. This problem was also noted by an accreditation team that visited the school in the spring of 1996. After a week of observations and interviews, the members of the team recommended that the staff receive in-service training so that they would be better able to use the school's software and hardware, and be offered effective computer instruction (Mott and López, 1996).

It was not only important that the teachers be able to offer instruction concerning computers. Computer proficiency was also important for the teachers' professional work outside of the classroom. The upper grades at the target school were already using a computer generated report card, and there were plans to extend this process to the lower grades. The administration also wanted to create a communication system that would permit parents to contact the school via the internet. Since the school is located in a foreign country, it was important that the teachers be able to have various economical and rapid forms of communicating with colleagues in the United States and at the other American schools

around the world. The school's Internet connection provided such capabilities. The teachers at the school had access to many technological tools, and more software and hardware were being acquired each year. However, the usefulness of any tool is determined by the adeptness with which it is wielded. At the school the usefulness of its computer hardware and software was limited by the computer illiteracy of the majority of the faculty prior to the implementation of the author's computer in-service program.

The first proposed objective was: During the 12 weeks of the computer program, 100 percent of the five targeted female teachers will develop more positive attitudes toward computer use in the classroom setting, and toward their own abilities to utilize computers effectively and efficiently, as indicated by receiving an average score of three or above on the section of the computer survey (Appendix A, p. 62) that sought to ascertain teacher attitudes.

The second proposed objective was: After a 12-week computer in-service program, 100 percent of the target group of 14 female teachers will increase their abilities to use computers for professional and personal tasks, as evidenced by receiving an average score of three or above on the computer usage section of the computer survey (Appendix A, p. 62). Further proof of satisfactory achievement by the teachers would be obtained from one-to-one interviews with each of the participants at the end of the program, and from the weekly session logs (Appendix C, p. 69) that all participants and their mentors would complete. These logs would indicate which specific skills the teachers

wished to learn during each session, and if these skills, in the judgment of the instructors, had been successfully mastered. The author would review these logs on a weekly basis.

The third proposed objective was: As a result of the 12-week training program, the teachers' abilities to use computers to solve their own computer-related problems, to perform maintenance tasks, and to install peripheral equipment will increase as seen by a reduction in the time spent assisting teachers by the computer coordinator to the 30 minutes per week allotted for this activity by the administration as indicated by a review of the computer coordinator's log (Appendix D, p. 71).

The final proposed objective was: During the 12-week computer in-service program, 100% of the 14 target teachers will develop personal goals as indicated by the completion of individual program goals sheets (Appendix E, p. 75). The teachers' goals would be based on a comparison of what they knew about technology and what they believed they needed to learn in order to become more effective computer users and instructors.

The author maintained a journal during the course of the project's implementation. This served to chronicle the actions that were taken before, during, and after the project's implementation. The author used this log in order to assess the overall effectiveness of the program, as well as to provide insight into the practical matters of scheduling sessions, training instructors, and providing access to needed equipment.

CHAPTER II

Research and Planned Solution Strategy

Most effective in-service programs are based on valid and pertinent research. This chapter contains reviews of applicable research that the author studied before developing a proposed solution strategy. The final section of the chapter addresses this strategy and links each of its components with the corresponding research.

Research

In the past, many in-services had been attempted at the school in an effort to promote teacher development and improve instruction. However, most were implemented due to a feeling of need, with little contemplation of which types of training would be the most effective in each situation. Seldom had research been reviewed by any school personnel to determine how teachers would best be able to learn new skills and change their beliefs. The author reviewed extensive research, and found a number of studies and implemented program models that were pertinent to the topic of changing teachers' attitudes toward technology and their acquisition of computer skills. The author's project was based on information gained by reviewing this research.

A survey of elementary teachers' perceptions about technology utilization in education was developed by Chin and Hortin (1993). It was

their desire to create a list of guidelines that could assist in the development of technology training programs for teachers. The survey instrument had two different sections. The first dealt with the participants' perceptions of administrative leadership, support, estimated use of computers, and technology utilization in the classroom. The second focused on the features of the existing computer program at each teacher's school, the types and the frequency of in-service training that was available, and the personal and professional background information of each of the participants. Survey forms were distributed to 285 elementary teachers, and 54.4 percent of these were returned in usable form.

An analysis of the completed survey forms revealed that administrative support of technology caused teachers to experience a greater interest in learning about computers, and in using them as a part of their jobs. The survey analysis also indicated that most teachers did not participate in technology training because they wished to increase their technology skills. Instead, they participated when they could see how the use of the new technology would help them to become better teachers, and their students to become better learners. The demographic data indicated that 78 percent of the respondents reported that they spent 30 minutes or less per day using technology. Fourteen percent reported that they never used it. A final conclusion of the survey was that the responding teachers felt that there was a need for more computer in-service training, with weekly one-hour workshops being the preferred mode of instruction. The incorporation of hands-on activities

into the training program was considered to be imperative to a workshop's success. Many in-service programs failed to use this effective method of instruction.

A topic of concern that is mentioned frequently centers on the influence of computer anxiety on the integration and utilization of new technology. Research conducted by Marcoulides (1988) sought to determine whether computer achievement was affected by computer anxiety. Subjects for the study consisted of 72 university students who were attending a mandatory course in computer information systems. The Computer Anxiety Scale (CAS) and the Computer Aptitude Literacy and Interest Profile (CALIP) were the measurement instruments used in the study, along with a review of completed homework assignments.

Marcoulides found that students with high degrees of computer anxiety were more likely to have a lower Computer Aptitude Quotient (CAQ) than those who had little fear of new technology. This researcher also suggested that although greater aptitude and experience could increase the effective utilization of computers, computer anxiety played a larger role in achievement. According to these findings, a lessening of computer anxiety could be achieved through the use of small support groups, tutoring activities, and learning situations that the students would not perceive as being threatening. It was concluded that decreasing computer anxiety should result in increased computer achievement.

Smith (1987) attempted to discover how the computer attitudes of pupils and teachers were related to gender and grade level. To achieve this end, the researcher conducted studies in two different settings. In the

first study 491 students and teachers from one school district participated. Eighty-two of the participants were Anglo, with various minorities making up the rest. This school district had implemented a computer curriculum two years prior to the study. All of the students were required to attend computer classes, and 90 percent of the teachers stated that they had received computer instruction ranging from introductory workshops up to three university courses. For this study the Minnesota Computer Awareness and Literacy Test was utilized. All teachers took this test, while a random sampling of students was used.

Results of this study suggested that the student participants had more confidence in their own abilities than did their teachers. It also appeared that males had a stronger belief that males were better able to master computer skills. In general, the females believed that both genders were equally able to become proficient users of computers.

The second study differed from the first in three ways. First, the participants came from a number of schools in separate districts. Second, the target schools had only recently begun to implement their technology programs. The final difference was that while the schools in the first study had mostly white populations, those in the second had populations that were mainly composed of American Indians and Hispanics. The measurement, design, and procedures were similar to those employed in the first study.

The results of the second study indicated that children at lower grade levels had greater confidence in their own computer abilities than did those at upper grade levels. The results also suggested that the female

teachers felt more confident than did their male colleagues. Teachers exhibited a stronger belief that both sexes were identical in their potential for learning and utilizing computer skills. As in the first study, this belief in gender equality was stronger in females than in males. In conclusion, the researcher expressed concern that the study had revealed that in the school district where a computer program had existed for two years, the confidence level of the teachers was lower than in the schools where the computers had only just begun to appear. The researcher felt that this could have resulted from the fact that in the first situation the computers were not located in the classrooms, but were placed in a lab setting. The students at both schools received regular computer instruction, while the teachers had limited access to computers and received only sporadic workshops. Therefore, the teachers could see how their students were outdistancing them in regards to computer proficiency, and this could have created doubts concerning their own abilities.

Delcourt and Kinzie (1993) conducted a study in order to assess the correlation between teachers' attitudes toward computers and their perceived self-efficacy. It was felt that if teachers had negative attitudes regarding computers, they would lack the confidence to attempt learning new computer skills. This lack of confidence would also lessen the effort and persistence with which teachers would approach training. Three measurement instruments were developed. The first addressed attitude, the second focused on self-efficacy, and the third provided demographic data. Various experts reviewed the instruments, and revisions were made according to their recommendations. A total of 328 undergraduate

and graduate students from six universities completed the measurement instruments. The average age of the participants was 25 years.

The results of the study seemed to demonstrate that attitudes could significantly predict an individual's perceived self-efficacy. As a result of their study, the authors suggested that if teachers could have positive experiences with computers, they would have higher levels of confidence and positive attitudes toward technology. These, they reasoned, should lead to greater acceptance, utilization, and demonstration of computer skills in the classroom. Delcourt and Kinzie suggested that further research should take place to provide better documentation of this belief.

For many years a number of training programs and methods have been utilized in order to educate workers. Carter and Parker (1993) surveyed professional trainers in an attempt to ascertain which training methods were deemed to be more effective. The authors developed a survey and mailed 250 forms to trainers. Thirty-two percent of them were returned in usable form. Of the respondents, 59 percent were male, and 41 percent were female. The males had an average of 14.2 years of professional experience, while the length of experience for the females averaged 8.4 years. Forty-six of the respondents stated that they had accumulated most of their experience in educational settings. Eight different training methods were rated according to their perceived effectiveness.

An analysis of the responses revealed that individual exercises and programmed instruction were perceived to be the most effective means of

instruction, especially when learning visual information and procedures were the goals of the training program. The authors concluded that the results of their survey seemed to signify that there should be less dependence on lecture formats for training and greater reliance on individualized approaches whose pace would be determined by the learners. Unfortunately, many in-service programs continue to use lecturing as the primary mode of instruction.

It is a common belief that people's needs change as they grow older. Melnick, Iwanicki, and Gable (1989) investigated whether teachers' perceived needs for staff development changed as they aged and acquired teaching experience. A survey instrument was created that contained 44 items covering the topics of instructional planning, instruction, evaluation, and professional responsibility. Using a five-point Likert scale, the subjects were asked to rate their feelings of need for in-service training for each of the 44 items. Surveys were sent to 2,796 teachers in 48 Connecticut school systems. Sixty-four percent of the forms were returned.

The study's results indicated that the areas with the greatest perceived need were the areas of technology and resource utilization. It was found that this perception did not seem to diminish as the teachers' work experience increased. All other categories, except one, showed decreased perceptions of need as the subjects' length of experience increased. Based on their findings, the authors recommended that in-service planners should consider the effects of the participants' years of experience and age when developing any training program. Targeting

those teachers whose perceived needs for training were moderate or high was considered to be one way to increase the effectiveness of staff development programs. They also suggested that a variety of needs assessment techniques should be employed so that each teacher could be properly served.

Several descriptions of actual computer integration programs were examined by the author of this proposal. One of these was implemented by the Roswell Independent School District (Bennett, 1995). Its purpose was to integrate computers into the school system. Since previous research had shown that teachers more readily accepted new technological innovations when their administrators were seen as proficient computer users, the district decided to train their administrative staff members first. The course lasted 14 weeks, and 19 out of 44 administrators participated. The participants met for two hours each week, with the first hour devoted to hands-on activities. Individualized instruction was the mode of delivery, and mastering applications was the goal. The second hour of each session consisted of a combination of lecture and discussion. Some of the topics covered during this part of the session included technology management, copyright laws, and learning processes.

The program was evaluated using attitudinal surveys, the journal entries of each participant, and a final survey that assessed the importance of the various components of the program. The evaluations revealed that most of the participants entered the program with positive attitudes toward technology, and that these did not change during the

implementation of the program. It was determined that anxiety levels did change, decreasing greatly as the program progressed. On the final survey, a majority of the participants chose technology integration and single-computer classroom organization as the two most useful subjects covered during the program. The most useful application was judged to be word processing. The lack of sufficient time was felt to be a deterrent to the mastery of new computer skills. Lastly, the administrators stressed the importance of individualized instruction as a crucial element that greatly contributed to the participants' successful completion of the program. In closing, the author suggested that administrative training, individualized instruction, hands-on activities, personal encouragement, ongoing evaluation, and an avoidance of one-day workshops would enhance a technology program's effectiveness.

A study to identify which personality types would be more likely to accept new technology and more likely to attempt transferring their knowledge to colleagues was implemented by Rude-Parkins, Baugh, and Petrosko (1993). The subjects of this study were 288 teachers from 24 high schools. Sixty-nine percent were male, and 31 percent were female. Each participant received 60 hours of computer instruction. All of the participants stated that the acquisition of new computer skills was of great interest to them. At the end of the training period, it was expected that they would attempt to convey their knowledge to their colleagues via coaching, demonstrating, and leading in-service workshops. School-based assistance and follow-up support were provided.

After the program's implementation, all participants were rated on their levels of computer adoption. The three levels were labeled as high, medium, and low. Two thirds of the participants were rated as having a medium or high level of adoption. The remaining third were rated as either low-level users, or they had abandoned the program altogether. The authors also analyzed the data obtained from the administration of The Meyers Briggs Type Indicator. They found that the personality types in the subject group did not correspond with the make-up of the general population, and they concluded that there seemed to be no correspondence between personality type and the likelihood that a person would adopt new technological innovations. However, the authors suggested that although all personality types may achieve the same levels of adoption, they may have different rates of acceptance. Persons who were innovators were usually the first to give acceptance, followed by the leaders, and finally, the resisters. It was recommended that the teachers who were innovators should be given encouragement and be used as models. Those who were perceived to be leaders would take longer to accept an innovation, but once they had accepted it, they would be the ones that could coach and facilitate innovation adoption by those personality types that generally resist the introduction of new technology. This information should be very helpful when introducing any new innovation within a school setting since most faculties are composed of various personality types.

The Microcomputer Infusion Project (MIP) was instituted at Arizona State University (Rossberg and Bitter, 1988). One of its objectives was to

encourage computer proficiency within the university staff and faculty. A second goal was to raise the comfort and confidence levels of the faculty concerning computers. It was hoped that this would encourage the instructors to more readily infuse computers into their preparation and presentation activities. The program was open to all employees and was strictly voluntary. In the early stages it was utilized more by the support staff. In order to encourage greater participation, the MIP team made the program more flexible, and a new philosophy was adopted. This philosophy stated that the participants could elect which software they wanted to master, and the MIP team would teach the clients to use computers in a variety of ways. Clients could choose the form of their training, clients would have access to a complete computer lab, the MIP team would provide timely support, proficiency levels would not be used to exclude any clients from participation, and no participant would be refused aid. The program focused on the use of computer application programs, but future plans included a greater use of database applications. The form of instruction consisted of one-to-one sessions, with each instructor and the student working together to set goals and plan how each session would be conducted. Even after each client had mastered the desired skills, and lessons had ceased to take place, the client could receive support from the MIP team whenever it was required. A hotline was created to give the students greater access to the support team.

Although no formal evaluation data were offered in the report, the authors noted several positive outcomes that they had observed. They

found that more faculty members were producing materials that, in past years, had been routinely assigned to support staff. It was also noted that the total hours of computer lab use had increased to the point that a second lab needed to be reserved for student use in order to provide sufficient access to computing equipment. The authors suggested that until educators were at ease with computer hardware and software, this technology would never be fully integrated into the classroom. The authors believed that their program had effectively moved them closer to achieving this goal.

Another computer integration program was described by Thompson, Schmidt, and Hadijiyianni (1995). This three-year program was implemented at the College of Education at Iowa State University, and its goal was the effective integration of computer technology into their teaching program. During the first year of the program, all teaching staff were given office computers and offered informal training classes. In the second year, a mentoring program was instituted. Most of the mentors were graduate students, and a variety of mentoring approaches was utilized. The final year of the program saw the continuation of the mentoring program, with a special emphasis on developing language arts activities which incorporated technology, using telecommunications for pupil information exchange, participating in simulation activities, exploring the utilization of distance education techniques, using computers to prepare classroom materials, and using computer-assisted instruction as a way to improve teaching. Teachers at the Spanish target school were also interested in learning more about these areas.

The authors discovered that although the instruction offered during the first year of the program was useful for teaching basic skills, it was necessary to provide individual training if the teachers were to incorporate technology into their lessons. It was difficult for the university to find sufficient qualified personnel to provide this type of individualized instruction. They solved this problem by offering a graduate level course in educational technology. In order to complete the field experience component of this course, the students were required to serve as mentors in the authors' program. This solution provided the authors with a reliable source of trained mentors so that each of the program's participants would be able to receive the benefits of individualized instruction.

At the end of the program, the authors reported that computers and technology had been widely incorporated into the teacher education program. Most faculty members were enthusiastically employing technology inside and outside of their classrooms. It was also noted that faculty members and students regularly exchanged information and ideas concerning technology and its uses. Easy access to computers, voluntary participation, a yearly goal of technology integration, and an individualized mentoring program were given as crucial factors that contributed to the success of the program.

At one school a principal created and implemented a computer literacy program (Hurst, 1994). The goal of the program was to increase the computer skills in the areas of word processing, databases, and spreadsheets. The principal suggested that any future programs should

include desktop publishing, multimedia applications, and communication applications using the Internet. The idea of implementing a one-day in-service program at the start of the academic year was rejected since it seemed impossible to accomplish significant change in that limited amount of time. Instead, this principal reported that greater success was found by having the teachers teach one another during the course of the year. It was suggested that allowing the participants to choose their own sets of goals and activities contributed to the success of the program. When teachers were able to create plans based on their own interests and needs, they were more enthusiastic in their participation and more likely to acquire new skills. It was the principal's belief that creating an environment where the participants could feel at ease was an important feature of the program. It was observed that the teachers were more likely to learn and perform well when they had no fear of appearing foolish in front of other teachers or students. Although the program creator did not state how the program had been evaluated, the need for continual evaluation was stressed. It was suggested that formal surveys, suggestion boxes, staff technology use logs, audits of computer software and equipment, and observations of computer utilization within classrooms were valuable assessment tools.

The Computer Mentor Program was developed and evaluated by MacArthur and Pilato (1995). The goal of this program was to increase the effective utilization of computers in schools via a mentoring model. During the three years of the program's implementation, 59 mentors and 154 protégés were selected to be participants. Instructional computer

experience, interpersonal skills, and administrators' recommendations were utilized to determine which mentor candidates would be selected. These candidates received mentor training which consisted of a one-semester course that dealt with the mentoring process. The mentors, in turn, enlisted protégés from their schools. It was felt that this form of recruitment would allow greater opportunities for the participants to have contact with each other, and it would also create a greater impact on the instructional practices of each school.

An important component of the program was the use of Individual Mentoring Plans (IMPs). Each mentor and protégé worked together to write an individualized set of goals, objectives, and activities. Successful completion of the IMP objectives was used for the awarding of in-service credits. Instruments used to evaluate the program included course evaluations, a computer use survey, and the protégés' computer logs.

An examination of these data indicated that the program had been successful. Ninety-five percent of the protégés felt that they had increased their technical expertise, and 85 percent felt that they were better able to use computers in their instructional setting. Of all of the protégés, 88 percent felt that the mentoring program had been more effective than previous traditional programs. It was the belief of the authors that individualization, timely support, and anxiety-free settings were integral components of this mentoring program. The program's cost effectiveness was mentioned as a major benefit.

Even though the target school of this practicum project is located in the suburbs of a major Spanish city, its teachers suffer many of the same

staff development disadvantages that isolated rural American schools have had to endure. Language differences do not promote cooperation with local schools, and these differences also limit easy access to outside experts. The faculty of the school must rely on its own personnel as a source of most of its in-service instruction.

Borchers, Shroyer, and Enochs (1992) conducted a study to investigate and evaluate the changes that occurred when teachers in rural schools participated in a long term computer in-service program. A three-year training program was used. Its ultimate goal was to facilitate the infusion of computers into the teachers' science instruction. To accomplish this, the program trained teachers to train their colleagues.

In the first year of their training the participants learned to use the computers. During the second year the emphasis was on leadership skills, peer coaching, and collaborative learning. When they entered the third year, the teachers were expected to return to their schools as technology leaders and serve as models for their colleagues. In the 1992 report, the authors evaluated the first year of the implementation.

In order to determine which variables affected the successful incorporation of computer technology in rural schools, the authors surveyed the participants at three times; before, during, and after the implementation of the first year's coursework. The second survey was conducted shortly after the completion of the initial two-day workshop, and it was used to compare the effectiveness of a short, intense workshop with the effectiveness of a longer sustained effort. To avoid having a limited sampling of subjects, the survey's authors enlisted the

participation of a greater number of rural school districts. Fourteen subjects were selected by officials at their schools, and they represented a diverse mixture of ages, years of experience, genders, degrees held, and grade placements. The teachers took part in an initial two-day workshop, and monthly half-day seminars.

When the effects of the training program were evaluated, the authors arrived at several conclusions. First, the teachers' opinions of their own abilities had increased after the initial two-day workshop, but this change was not significant. However, the changes which occurred during the full year of the program were deemed to be significant, and demonstrated that one-time, short-term workshops were less effective. It was also noted that the rate of computer use increased dramatically. Before the project had been implemented, all of the target teachers had access to computer equipment, most within their classrooms. They reported that they seldom used it. After the first year of the program, all but two of the participants reported that they were using the computers regularly as a part of their jobs. They had also broadened the scope of their computer use, and began using the equipment to accomplish tasks that the program had not directly addressed. A third finding of the authors was that adequate administrative support was a crucial element of the program that contributed to its success. Finally, they stressed that a rural setting could work to a school's advantage. A smaller work setting provided better opportunities to develop feelings of collegiality, cohesiveness, and commitment. This atmosphere also seemed to improve the effectiveness of each participant's required action plan.

A school superintendent in Indiana implemented a program in which teachers were used as in-service instructors (Swan, 1990). Funding was provided by a state grant. Teachers and the union were assured that the program would not involve any teacher evaluations. This was done in order to encourage the participants to be willing to take risks and explore new concepts. Participation was voluntary for the teachers, but was mandatory for the administrators. Twenty-three teachers were chosen to participate in the first phase of the training. They attended a seminar held outside the district that focused on instructional improvement. They also observed similar programs in neighboring districts. Once the seminar had been completed, the participants returned to their school, and divided into groups of four or five individuals. These groups conducted monthly training sessions whose goals centered on the transference of the trainers' knowledge to their colleagues. Teachers received a stipend of $60 per session in return for attending the sessions after the regular workday had ended. Between the sessions, all of the teachers were encouraged to observe and coach one another. The instructional skills presented were general in nature so that participants from different subject areas could work together. The teachers were generally free to choose which topics they focused on during the sessions.

Swan (1990) reported that the program had had a positive effect on the district. It was noted that in subsequent years, over 80 percent of the faculty had participated in the program. Due to the program's success, many of the participating teachers were asked to present similar training

sessions in other districts. The superintendent felt that this in-service program had ignited the enthusiasm of the teachers, and had propelled them into being active participants in the staff development process.

In an effort to learn more about computer training as it has been employed at the target school, the author of this practicum personally interviewed the school's head computer coordinator (Fenn, 1996). This teacher had worked at the school as a math and computer instructor for 24 years, and holds a Master's degree in Education. The coordinator had been involved with computers for many years, and had attended numerous training programs that have dealt with technology, and its application in educational settings. Part of the coordinator's duties consisted of conducting computer in-services when requested to do so by the administration. Most of these took place when new equipment or software had been purchased. They were usually one-day workshops conducted during the preplanning week of school each year, and attendance was usually mandatory. The main form of instruction was lecturing, with minimal utilization of hands-on activities.

The coordinator felt that most of these staff development efforts had been in vain due to several factors. First, at most workshops there was no allowance made for the different interests, needs, or ability levels of the participants. Also, the lack of sufficient software and hardware severely limited the opportunities for meaningful practice during the lessons. The scheduling of the workshops at the beginning of the year was seen as an additional handicap since most of the teachers were more concerned with preparing their classrooms than they were with

acquiring new computer skills. Last, the lack of timely support and follow-up activities was a factor that also contributed to the overall ineffectiveness of the workshops.

When asked what techniques had been effective in transferring computer skills to others, the coordinator mentioned individualized instruction. On those rare occasions when this teacher had the chance to work with individuals on a one-to-one basis, the outcomes had been more positive. The students were more relaxed, acquired skills more rapidly, explored new areas in greater depth, and returned often for more information after the lessons had ceased. In this veteran computer teacher's opinion, any program that did not take the participants' differences into account would be doomed to failure, or at least to the realm of mediocrity.

Solution Strategy

Based on the research reviewed for this project, the author conducted a 12-week individualized computer staff development program at the target school using teachers to instruct their peers. The duration of the program followed the findings of Borchers, Shroyer, and Enochs (1992) whose study revealed that one-shot workshops were only slightly effective, while extended programs were felt to be significantly effective. Using the results obtained from the study conducted by Carter and Parker (1993), lecturing was limited to the first phase of the program when computer history, computer maintenance, copyright law, technological vocabulary, and classroom computer management were

discussed. Although in this phase, as well as the second and third phases of the program, there were ample opportunities for hands-on activities as suggested by Chin and Hortin (1993). In the second and the third phases of the program individualized instruction was the mode of instruction. Based on the success of the Microcomputer Infusion Project (Rossberg and Bitter, 1988), the author let the participants select which computer applications they wanted to learn. They also worked collaboratively with their instructors to set individualized goals and plan the learning activities by which they accomplished these goals as MacArthur and Pilato (1995) recommended. After-school and weekend support via telephone was available from the author and the other trainers based on the recommendations of Rossberg and Bitter (1988). Participation in all phases of the program was strictly voluntary as suggested by Thompson, Schmidt, and Hadijiyianni (1995).

Marcoulides (1988) believed that participants' achievement would be enhanced if computer anxiety could be eliminated. The author created a relaxed environment by utilizing the suggestions of Hurst (1994). The individualized modules of the program took place in isolated areas of the school, and many took place after working hours. The teachers were more relaxed since they had no fear of appearing foolish in front of students or peers. Working one-to-one with trusted colleagues also helped to minimize the anxiety that teachers sometimes experience when learning computer skills.

In the past, the author had heard some of the target school's male teachers comment on the inability of females to master computer skills.

According to Smith (1987), this is a belief of many males within the teaching profession. Since all of the trainees were female, this bias needed to be weakened, if not eliminated. In an effort to lessen its potential to interfere negatively with the trainees' progress, the author attempted to make the male trainers aware of this bias by allowing them to review the research documents and by discussing the importance of supporting the entire faculty regardless of gender.

Melnick, Iwanicki, and Gable (1989) recommended that staff development planners should consider the length of each teacher's work experience when making training decisions. This was not a serious problem at the target school because the focus of the proposed program was technology utilization, and that was one of two areas that did not demonstrate a decrease in perceived need as the length of teaching experience increased. The author of this project used surveys, personal interviews, and teacher requests to assess the need for technology training. It seemed apparent that the perceived need for computer training was moderate to high for all of the participants. While it was doubtful that the length of tenure of the target teachers would have negative effects on their progress during training, the author discussed the results of this study with the participating trainers.

Administrative participation and support were deemed to be crucial to a computer program's success according to Bennett (1995). Therefore, the author convinced the school's director to participate in the program along with the faculty. The director indicated further support by agreeing that all participants would be allotted school funds that were used to

purchase classroom computer hardware and software. It was hoped that during the in-service program, the teachers' interest would be piqued, and they would desire to improve their classroom technology inventory by buying materials that they had learned how to use.

Some of the reviewed research documents mentioned using outside training for instructors or mentors. This option was not possible at the target school due to its location in a foreign country where English is not the native language. However, most of the training that was mentioned in the reviewed articles focused on either teaching the trainers how to use computers (Borchers, Shroyer, and Enochs, 1992), or on teaching them how to become mentors (MacArthur and Pilato, 1995), and these are skills that were not lacking at the target school. The trainers that worked in the program were already very familiar with the aspects of computers that they were requested to teach. In addition, the small size of the school was conducive to mentoring in that most of the teachers had already formed close collegial relationships due to frequent personal contact, cultural isolation, and an average tenure at the school of nearly 10 years.

Since this was the first time that this type of in-service instruction had been attempted at the target school, it was important to have effective forms of evaluation. Decisions concerning future implementations of this program could best be made if data from a valid form of evaluation were available. It was also critical to closely follow each participant's progress during the program's implementation so that any concerns or problems could be addressed in a timely manner. Evaluation of the

program and the progress of each participant was conducted using reviews of the trainees' individual goals and activities sheets (MacArthur and Pilato, 1995), surveys (Hurst, 1994), and personal interviews with each participant.

CHAPTER III

Method

Program Description

The author implemented a 12-week in-service program that focused on increasing the target teachers' computer skills and creating positive attitudes regarding computers. This strictly voluntary program consisted of three four-week modules. Prior to the implementation, signed permission release forms (Appendix F, p. 77) were on file for all participants. These stated what was expected of each participant during the course of the program, that any participant could withdraw from the program without prejudice, and that the confidentiality of all participants would be maintained. The author assumed the role of coordinator for all aspects of the program.

Two weeks prior to the program's implementation the author met with the six members of the training team. The program was presented to them, along with the related research. The team members were asked to reconfirm that they are willing to act as computer instructors for their peers. All agreed to participate. Each member's area of computer expertise was also reconfirmed. Copies of articles that focused on mentoring in general, and mentoring for computer instruction in particular, were distributed to the members. Trainer gender bias and the effects of the length of teacher tenure were two of the topics discussed.

Some of the trainers felt that they might not have been up to the task of instructing others. The author convinced them that they did not need to be familiar with all areas of computer technology. They were made to understand that it was only necessary for each of them to be familiar with one or two specific areas that the trainees were interested in mastering. The team was assured that the author would be available to answer their questions or offer assistance whenever it was needed during the implementation of the in-service program. Trainers and teachers were given the author's telephone number so that they could call for assistance whenever it was desired. The training team also met a second time before the implementation to discuss the mentoring articles, and to confirm the times that each of the team members would be available. Last minute questions or concerns were dealt with at that time.

The first four-week module took place in the spring of 1997 and was conducted by the author with the assistance of the school's computer teacher. It focused on the history of computers, the components of computer systems, the evaluation of software, the vocabulary of computer technology, the maintenance requirements of computers, the various ways to manage computer access in a classroom, and the copyright laws of Spain and the United States. Lectures, discussions, and hands-on activities were the primary modes of instruction. This first module created a foundation of knowledge on which the second and third modules were based.

The duration of each class was one hour and the classes took place once each week. Due to prior commitments of a few participants, it was

impossible to meet with all of the trainees on the same day each week. Therefore, it was necessary to present each week's lesson two times on different days. All participants were encouraged to take part in the discussions and hands-on activities. Since there were only seven trainees in each of the classes, there were frequent opportunities to ask questions, make comments, and be involved in the hands-on activities. This ability to actively participate kept the attendees from becoming bored. The sessions were held in the teachers' workroom at the end of the school day. The author presented each participant with a notebook in which information presented in this module, as well as the second and third ones, could be recorded. Coffee and light refreshments were served during each of the sessions in order to create an enjoyable and informal learning environment.

During this first phase of the program, all participants completed individualized goal sheets (Appendix E, p. 75). On these sheets they listed programs which they wanted to be able to use, or they listed general tasks they wished to be able to perform as a result of the training that they would receive. The author, as program coordinator, met personally with each participant to define more clearly each of the goals, and to determine which computer programs would permit these goals to be achieved. Some of the target teachers elected to wait until nearer the end of the module to complete their goal sheets, since it was necessary for them to become more aware of the potential uses of the computers and the software before goal decisions could be made. The author provided materials and information that the participants needed in

order to choose their goals. The information that the author collected during these interviews was shared and discussed with the training team. The members of this team were selected on the basis of their abilities to use computers proficiently. None was an expert in all areas of computer usage. However, each was knowledgeable concerning some facet of computer utilization. Instruction in the areas of telecommunications, spreadsheets, databases, word processing, desktop publishing, and multi-media were offered, and at least one member of the training team was familiar with each of these areas. As the goal sheets were completed, the team created training partnerships for the second and third modules by matching the goals of each trainee with the computer expertise of each of the trainers.

The author examined the schedules of each of the trainers and trainees to determine during which hours the training sessions could be held. Due to the difficulty in finding time periods during the school day when the trainer and trainee were both free, most of the sessions had to take place after school. Whenever a time period could be arranged during the workday, it was offered as an option. Trainers and trainees were notified of their session schedules prior to the start of the second module. Each participant was given a copy of each module's weekly schedule, and reminder notes were sent to the participants on the days when they were scheduled to attend sessions. At times a trainer or trainee was not able to attend a training session. On those occasions it was easy to reschedule the sessions since only two individuals were involved. The rescheduling was handled by the trainers and the trainees.

The trainers informed the author whenever a class had been rescheduled, and the completed session logs (Appendix C, p. 69) indicated that sessions had been made up .

In the second and third four-week modules, the training method consisted of individualized instruction with an emphasis on hands-on activities. The trainees met with their trainers for one hour each week. To create a relaxed and tension-free atmosphere, the sessions took place in unoccupied areas of the school where the participants could have some degree of privacy. Many of the teachers chose to have their sessions conducted in their classrooms since it was in those locations that they would usually do their computer work. Those teachers who did not have computers in their classrooms usually worked on one of the two computers in the teachers' workroom. Lessons concerning the Internet were conducted in the library since the only Internet connection was located there. The librarian reserved specific times so that there would be no unnecessary interruptions during the lessons. Some of the lessons were conducted during the evening hours via an Internet connection between the author and the trainees from their respective residences.

At the start of every session, each trainer and trainee completed a page of the session log (Appendix C, p. 69). They listed the goals of the session, the activities that were to be used, and the results of the previous week's homework assignment. Flexibility was allowed, and some trainees elected to modify their goals in order to satisfy some need or interest that had arisen as a result of their previous sessions. For

example, one teacher had an initial goal of creating a class magazine. However, after seeing how photos could be imported onto a page, the trainee chose to explore the ways that a digital camera could be used, and decided to spend less time on learning how to create a magazine.

Using the trainees' goals for the session, the trainers demonstrated each skill and explained the steps necessary to perform it correctly. The trainees practiced each skill in a variety of ways, with the trainers providing assistance as necessary. If a problem occurred during the lesson, the trainers and trainees were encouraged to work together to discover a solution. If no solution became evident, the trainers noted the problems and brought them to the next meeting of the training team. The team members were able to solve all of the problems that arose so that workable solutions could be presented and explained to the trainees during their next scheduled lessons.

At the end of each training session, the trainers and the trainees agreed on an assignment that the trainees needed to complete before the next session. These assignments reflected the skills covered during the current lesson, as well as those covered in previous lessons. The trainers and the author were available during the week to offer appropriate and timely support when it was requested by the trainees. Whenever an assignment was determined to be incomplete or incorrectly done, the trainers worked with the trainees to remediate the problem area. Successful completion of each assignment demonstrated that the preceding lesson's skills had been mastered by each trainee. The satisfactory completion of each assignment was noted on each trainee's

weekly session log (Appendix C, p. 69). Session logs were reviewed by the author on a weekly basis in order to assess the progress of each participant and to be aware of any problems that needed to be addressed in a timely fashion. The author also met individually with the trainers at least once a week.

The third four-week module's methods and procedures were identical to those of the second module. Most participants elected to learn skills in a different area of computer technology. However, in keeping with this program's policy of flexibility, each participant had the option of using this module to explore the topics presented in the second module in greater depth. This occurred more often with those participants who learned Internet skills during the second module, since this facet of technology is much broader in scope.

When the third phase of the program had been completed, trainers and trainees completed a program evaluation (Appendix G, p. 79). The purpose of this evaluation was to determine how well the program functioned, and how it might be improved for future use. The author personally interviewed all participants to review their responses and opinions in greater detail. The trainees also retook the computer survey (Appendix A, p. 62) which they had completed in the fall as a part of the program's needs assessment. The results obtained from this re-administration were used to assess whether the first and second objectives that were stated in Chapter I had been satisfactorily achieved.

The author reviewed the coordinator computer log (Appendix D, p.71) during the implementation of the program. The average weekly time

that was spent solving the teaching staff's computer problems was calculated. This average weekly time was used to determine if the third objective stated in Chapter I had been met.

All of the materials and equipment that were needed during the implementation phase were readily available at the school. The main job of the coordinator was not to procure new equipment, but to coordinate schedules so that the school's equipment would be available for use at the proper time. Six instructors were sufficient to provide suitable training for the participants. The school had a number of staff members that were skilled in different areas of computer technology, and with several training areas to choose from, the coordinator had less trouble arranging training schedules. One instructor had to withdraw from the program due to a lack of available time, but another person volunteered to assume those instructional duties. A benefit of working at a small foreign school was that the faculty was very cohesive and was aware of the need to be flexible. This atmosphere of collegiality helped the author greatly in his role as program coordinator.

Timeline

Week	Activities
Two weeks prior	Permission release forms signed Met with training team Prepared materials for first module
One week prior	Met with training team Scheduled use of teachers' room
One	Began first module of the program

Three	Handed out personal goal sheets Conducted personal interviews with each participant to discuss their goals
Four	Reviewed personal goal sheets Coordinated schedules of trainers and trainees Met with training team to confirm schedules and training roles Informed participants of schedules
Five to eight	Second module took place Weekly reviews of session logs Weekly meetings with each trainer
Nine to 12	Third session took place Weekly reviews of session logs Weekly meetings with each trainer
Post-implementation	All participants filled out program evaluation forms All participants again completed the computer survey One-to-one interviews with participants Review of computer coordinator log Presented report to the teachers and the school's board of directors

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CHAPTER IV

Results

For this computer program the author created a computer survey (Appendix A, p. 62). This instrument consisted of 20 items. It was first administered in the fall of 1996 prior to the program's implementation as a needs assessment. It was re-administered in the spring of 1997 after the implementation and served as one of the program's evaluation tools. On both occasions the surveys were distributed to the participants who completed them and returned them to the author within three days. In order to clearly understand the meaning of some of the survey statements, some of the non-native speakers of English at the school requested that the author be present while they completed the forms. The author offered only clarification and did not attempt to influence the responses of the participants.

The first six items on the survey were statements concerning attitudes toward computers and technology. Three of the statements were phrased negatively. Using a five-point Likert scale, the participants indicated to what degree they agreed with the statements. For this project it was considered that an average score of three or higher on this section of the survey indicated a positive attitude toward computers and technology, while a score of less than three indicated a negative attitude toward computers and technology. On the survey that was administered prior to the program's implementation six teachers received average

scores of less than three on this section (See Table 1: p. 8). Their average scores ranged from 2.33 to 2.84, with a mean of 2.61. These six teachers became members of the first target group. However, prior to the program's implementation, one teacher chose not to participate.

The first objective of the program was: During the 12 weeks of the computer program, 100 percent of the five targeted female teachers will develop more positive attitudes toward computer use in the classroom setting, and toward their own abilities to utilize computers effectively and efficiently, as indicated by receiving an average score of three or above on the section of the computer survey (Appendix A, p. 62) that sought to ascertain teacher attitudes.

After the implementation, the five members of the target group completed the survey again, one participant having chosen to withdraw from the program after the administration of the needs assessment. On the post-implementation survey the target group members' average scores ranged from 3.00 to 3.33, with a mean of 3.17 (See Table 2: p. 48). The smallest increase was 0.17, while the greatest was 1.00. The mean increase was 0.53. An examination of the frequency of survey responses (Appendix H, p. 81) showed a shift of the trainees' responses from the negative to the positive side of the scale and supported the author's belief that the participants' attitudes toward computers had become more positive. The program's first objective was met.

Even though the program participants who received a three or higher on the pre-implementation attitude survey were not targeted for improvement in this area, it was very interesting to note that on the post-

Table 2

Range of Computer Survey Scores

Attitude

	Pre-Implementation	Post-Implementation	Change
	2.33	3.33	+1.00
	2.50	*	
	2.50	3.33	+0.83
	2.67	3.00	+0.33
	2.83	3.00	+0.17
Target Group ↑	2.84	↑ 3.17	+0.33
	3.00	3.33	+0.33
	3.00	3.33	+0.33
	3.17	3.33	+0.16
	3.33	3.67	+0.34
	3.33	4.33	+1.00
	3.33	4.17	+0.84
	3.33	3.50	+0.17
	3.33	4.17	+0.84
	3.33	**	
	3.50	4.17	+0.67
	4.17	**	
	4.20	**	
	4.33	**	
	4.50	**	
	4.67	**	

* One member of the original target group chose not to participate in the training program.

** Trainers who were not members of the target group and did not complete the post-implementation survey.

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implementation survey, all of their attitudes became more positive as well. The increase for this non-targeted group ranged from 0.16 to 1.00, with a mean increase of 0.52. This would seem to indicate that continued computer instruction can further improve the attitudes of those teachers who already have a positive perception of technology.

The second section of the author's computer survey (Appendix A, p.62) focused on the teachers' perceptions of of their own computer abilities and their utilization of computers. This section consisted of 14 statements, five of which were phrased negatively. Using a five-point Likert scale, the participants indicated the frequency with which they exhibited the stated behaviors, with negatively worded items carefully tabulated. An average score of less than three indicated a negative perception of a teacher's computer usage and knowledge.

When the computer survey was administered prior to the implementation of the program, 15 participants received average scores of less than three (See Table 1: p. 8). Their average scores ranged from a low of 1.21 to a high of 2.93, with a mean of 2.21. Except for the one teacher who chose not to participate, these 14 individuals became members of the target group for whom the author's in-service program attempted to improve computer knowledge and utilization.

The second proposed objective was: After a 12-week computer in-service program, 100 percent of the target group of 14 female teachers will increase their abilities to use computers for professional and personal tasks, as evidenced by receiving an average score of three or above on the usage section of the computer survey (Appendix A, p. 62).

Further proof of satisfactory achievement by the teachers was obtained from one-to-one interviews with each of the participants a the end of the program, and from the weekly session logs (Appendix C, p. 69) that all participants and their mentors completed. These logs indicated which specific skills the teachers wished to learn during each session, and if these skills, in the judgment of the instructors, had been successfully mastered .

When the targeted 14 teachers completed the survey a second time at the end of the program's implementation, all received average scores of three or higher. The average scores ranged from 3.21 to 4.43, with a mean of 3.60. The smallest increase was 0.42, and the greatest was 2.26, with a mean increase of 1.35 (See Table 3: p. 51). The frequency of survey responses (Appendix H, p. 81) clearly showed a shift of the trainees' responses from the negative to the positive side of the scale. This provided further evidence that the teachers' perceptions of their computer knowledge and utilization had increased.

During the course of the implementation, the participants also completed weekly session logs (Appendix C, p. 69). The author used these to monitor the progress of each trainee and to keep abreast of any problems that occurred during the program's implementation. These logs were completed faithfully and satisfactorily by the participants. The logs clearly indicated that all trainees were making steady progress in their particular areas of interest. The few minor problems that occurred were noted and handled in a timely manner by the author and the training team.

Table 3

Range of Computer Survey Scores

Knowledge/Utilization

	Pre-Implementation	Post-Implementation	Change
	1.21	3.47	+2.26
	1.36	3.36	+2.00
	1.71	*	
	1.86	3.57	+1.71
	2.07	3.77	+1.70
	2.07	3.21	+1.14
	2.14	3.50	+1.36
	2.15	3.86	+1.71
	2.29	4.43	+2.14
	2.50	3.29	+0.79
	2.63	3.57	+0.94
	2.64	3.64	+1.00
	2.83	3.25	+0.42
	2.83	4.00	+1.17
Target Group ↑	2.93	↑ 3.43	+0.50
	3.00	**	
	3.36	**	
	4.00	**	
	4.21	**	
	4.36	**	
	4.92	**	

* One member of the original target group chose not to participate in the training program.

** Trainers who were not members of the target group and did not complete the post-implementation survey.

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Personal interviews were conducted with each of the participants at the end of the program. These one-to-one interviews were conducted in the privacy of each teacher's classroom or office. All of the participants indicated that they had enjoyed the program, and that they felt more confident using computers. They stated that they were utilizing the school's computer equipment more frequently, with more success and a greater feeling of accomplishment. The program's second objective was met.

The third proposed objective was: As a result of the 12-week training program, the teachers' abilities to use computers to solve their own computer-related problems, to perform maintenance tasks, and to install new peripheral equipment and programs will increase as seen by a reduction in the time spent assisting teachers by the computer coordinator to the 30 minutes per week allotted for this activity by the administration (Appendix D, p. 71).

During the program's implementation, the author recorded the time spent solving the teachers' computer related problems (Appendix D, p. 71). In the first two weeks of the program, the average weekly time spent was more than the 30 minutes the school's administration allowed for such tasks. Beginning in the third week of the implementation, the average time per week began to decrease, and remained below the 30 minutes for the remainder of the program. The average weekly time spent solving computer problems throughout the entire implementation of the program was 16.67 minutes. The program's third objective was satisfactorily met.

The final proposed objective was: During the 12-week computer in-service program, 100% of the 14 target teachers will develop personal goal plans as indicated by the completion of individual program goals sheets (Appendix E, p. 75). The teachers' goals will be based on a comparison of what they currently know about technology, and what they believe they need to learn in order to become more effective computer users and instructors.

While the first four-week module of the program was taking place, all of the participants completed their individual personal goal sheets (Appendix E, p. 75). The target teachers were encouraged to reflect on their current levels of computer literacy. They were asked to envision themselves at the end of the program, and consider the tasks that they wished to be able to perform as a result of their lessons. Though they were told that they could consider how these new skills could be utilized with their students, the author suggested that it was equally important that their chosen goals were in areas that interested them. A lack of interest would have decreased the program's effectiveness. An interested person is usually more motivated to learn new skills. It was felt that once the trainees had achieved a level of mastery, they would actively seek ways to use it in their classes. An examination of the computer in-service program evaluations (Appendix G, p. 79) that all participants completed after the program's implementation indicated that the trainees had mastered a variety of skills, and were employing them effectively.

On the goal sheets some of participants listed the programs with which they wanted to become familiar. Others were unacquainted with

the school's programs, and these individuals were allowed to select skills that they wanted to master without naming specific programs. Once the goal sheets had been completed, the author met with each participant to determine in greater detail their desires and needs. These one-to-one discussions were conducted in the privacy of each teacher's classroom or office. The author and the training team used the information obtained from the goal sheets and the discussions to create training pairs and to select programs that would allow each trainee to perform the tasks that they had listed. The final program objective was met.

In a further attempt to gain insight into the effectiveness of the program, the author asked each trainer and trainee to complete a computer in-service program evaluation (Appendix G, p. 79) and then conducted a one-to-one follow-up interview with each participant. The data obtained from these activities also helped the author to make appropriate recommendations concerning future implementations of the in-service program.

All participants stated that they felt that the program had been successful. They stated that they felt more confident when working with computers and less intimidated by technology. Several teachers mentioned feeling a sense of pride when they had discovered solutions to hardware and software problems that had occurred in their classrooms, without experiencing the need to call on someone else for assistance.

Some of the features of the program that the participants liked the most were: the freedom to chose personal goals in their particular areas

of interest, the flexibility of the schedules, the one-to-one instructional sessions, the relaxed setting of the group lessons which encouraged meaningful discussions, and the opportunity to interact with colleagues. The lack of sufficient time to practice skills, the need to attend classes after school, the sporadic nature of the school's Internet connection, the proximity of the implementation to the end of the school year, and the lack of monetary compensation were suggested as the least liked features.

The teachers offered several suggestions concerning future use of the author's program. They felt that it should be started earlier in the school year so that more time could be spent learning new skills and greater flexibility in scheduling could be attained. Many preferred that the classes be scheduled during the school day as much as possible. When this was not possible, they felt that after school participation should be rewarded with some type of compensation. Several of the participants believed that the individualized approach to in-service training had been so successful that they recommended that it be expanded to include other areas of staff development at the school. In the past, most in-service activities had consisted of one-time one-shot workshops. The participants felt that most of these staff development activities could be handled more effectively and economically by utilizing the author's program as a model.

CHAPTER V

Recommendations

At the end of the program's implementation a report was presented to the school's board of directors. In it the author gave a description of the program and its objectives, an acknowledgement of the participants, and a summary of the program's results. Using the data obtained from the computer in-service program evaluation (Appendix G, p. 79) and the post-implementation interviews, the author made several recommendations to the board.

First, the program should be implemented again in the near future. All participants felt that the program had been more effective than most in-service workshops. They were eager to continue their computer training.

Second, the administration should examine the teachers' work schedules and seek to find sufficient time during the workday so that one-to-one instructional sessions could take place without the need to stay beyond the close of school. Classes should begin in the fall and extend throughout the entire academic year. An earlier implementation would allow for a wider variety of scheduling options.

Third, the board should consider some form of monetary compensation that would be provided to the trainers, as well as the trainees, when lessons were conducted outside of the teachers' normal working hours. The teachers felt that they were stakeholders in the

computer in-service program. They believed that the school should increase its commitment to this type of staff development and become an equal partner in the improvement of the teaching staff.

Fourth, since the effectiveness of the individualized approach was so evident, many of the respondents recommended that the program be expanded to cover other areas of staff development. It was felt that the utilization of the mentor/mentee approach could be used to train teachers in the areas of portfolio construction and utilization, discipline techniques, classroom management, techniques for working with special needs students, creative writing, and art instruction. In the past many of these areas of need have been addressed by sending teachers to off-site training sessions, or by bringing an expert to the school for a one-time one-shot workshop. It would be more convenient and cost effective if these training activities could take place at the school using the experts that are already on the staff.

Fifth, the teachers who received training during the author's program should be encouraged to participate in future implementations so that the burden of serving as trainers would be more equitably distributed. During their post-implementation interviews, many of the participants offered to serve as trainers in future individualized computer training programs.

Sixth, the school should consider publicizing the program in the local newspapers in order to improve the school's image in the community. Many parents are very interested in their children's computer literacy. In an era of dropping enrollment, any positive publicity would be desirable.

Finally, the author recommends that in the future, the school consider the possibility of including the parents of the students in the computer training program. Some of these parents could serve as trainers, and others may wish to participate as trainees. Many of the school's students appear to be more computer literate than their parents. By learning computer skills, the parents would become better informed about what their children were learning at school. At the same time, they would become better able to help their children at home.

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Appendices

Appendix A

Computer Survey

Appendix A
Computer Survey

Name _____ Grade __ Date _____ Home Computer?___

Please indicate your responses to the following statements by circling one of the numbers below each of them. Note that circling a "1" indicates that you strongly disagree with the statement, and that circling a "5" indicates that you strongly agree with the statement.

1. I consider myself to be a computer literate person.

1 2 3 4 5

2. Computers are of limited value as a part of my curriculum.

1 2 3 4 5

3. I actively search for new ways to use the computer in my classroom.

1 2 3 4 5

4. I dread the emergence of new technological advances in education.

1 2 3 4 5

5. My students do not receive the maximum benefits of having access to computer equipment.

1 2 3 4 5

6. When new software and hardware become available at the school, I am eager to try them.

1 2 3 4 5 Average Score ____

7. I am familiar with the components of a computer system.

1 2 3 4 5

8. I am able to effectively teach my students how to use the school's hardware and software.

1 2 3 4 5

9. I am unfamiliar with the school's computer programs that are appropriate for my area of instruction.

1 2 3 4 5

10. I am familiar with the computer's maintenance requirements.

1 2 3 4 5

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Appendix A
Computer Survey (continued)

Please indicate your responses to the following statements. Note that circling a "1" indicates that you never exhibit the stated behavior, and that circling a "5" indicates that you frequently or very often exhibit the stated behavior.

11. I fail to understand what others are saying when they discuss computers in the educational setting.

1 2 3 4 5

12. I make suggestions concerning future software and hardware purchases.

1 2 3 4 5

13. When software or hardware problems occur in my classroom, I cannot solve them by myself.

1 2 3 4 5

14. When others have problems with their software or hardware, I am able to help them find acceptable solutions.

1 2 3 4 5

15. I am able to understand and use the information presented in software and hardware instructional manuals.

1 2 3 4 5

16. I am unable to modify the settings of computer programs in order to individualize the activities for each of my pupils.

1 2 3 4 5

17. I utilize the computers to perform professional tasks.

1 2 3 4 5

18. I utilize the computers to perform personal tasks.

1 2 3 4 5

19. I am unable to effectively evaluate software that the school has purchased, or is considering for purchase.

1 2 3 4 5

20. I perform regular maintenance procedures on my computer equipment.

1 2 3 4 5

Average Score _____

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Appendix B

Computer Coordinator Log Pre-Implementation

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Appendix B

Computer Coordinator Log - Pre-Implementation

Week of Sept. 2-6	Helped diagnose defective floppy disk drive.	30 min.
	Cleared up printer problem for second grade.	20 min.
	Set-up intern's e-mail.	15 min.
	Reconfigured library's Internet connection.	60 min.
	Installed cables in second grade.	10 min.
	Total:	**135 min.**
Week of Sept. 9-13	Trained intern to take digital pictures.	20 min.
	Configured Kids Pix for second and third grades.	20 min.
	Fixed library Internet connection problem.	30 min.
	Attempted to resolve office printing problem.	20 min.
	Cleaned the interiors of three computers of dust.	45 min.
	Total:	**135 min.**

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Appendix B

Computer Coordinator Log - Pre-Implementation (continued)

Week of Sept. 16-20	Tried to get office computer to print.	20 min.
	Installed ImageWriter in nursery classroom.	15 min.
	Total:	**35 min.**
Week of Sept. 23-27	Tried to get first grade's computer to start up and accept password.	20 min.
	Contacted SurfWatch in order to get information concerning a child protection program.	90 min.
	Total:	**110 min.**
Week of Sept. 30 - Oct. 4	Installed six CD-roms in grades Prekindergarten, Kindergarten, Two, Three, and Five.	120 min.
		40 min.
	Helped librarian get Eudora Lite to work correctly.	20 min.
	Resolved library memory problem.	
	Total:	**180 min.**
Week of Oct. 7-11	No problems this week	
	Total:	**0 min.**

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Appendix B

Computer Coordinator Log - Pre-Implementation (continued)

Week of Oct. 14-18	Resolved ROM memory problem in the library.	25 min.
	Reinstalled print driver for second and fourth grades.	30 min.
	Reconfigured print monitor in the teachers' room.	15 min.
	Total:	**70 min.**
Week of Oct. 21-25	Helped librarian reset the Kids Desk programs on the new computers.	30 min.
	Transferred new Netscape version to Internet computer.	15 min.
	Completed Internet search for Cybersitter.	30 min.
	Total:	**75 min.**
Week of Oct. 28 - Nov. 1	Continued the search for child protection program on the Internet.	40 min.
	Reinstalled print driver in second grade.	20 min.
	Helped school psychologist print up report.	15 min.
	Installed Ircle for new intern.	15 min.
	Total:	**90 min.**

Average Time Spent Per Week From Sept. 2 to Nov. 1 = 103.75 min.

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Appendix C

Session Log

Appendix C

Session Log

Name _____ Trainer _____

Date _____ Module _____ Session _____

Was last session's homework assignment completed satisfactorily? If the answer is "No", the remediation of the skills that were included in this assignment should be the first skill that you cover during the current session.

Please list the skills that you plan to cover during this session.

List the activities, programs, and equipment that will be used to learn and practice these skills.

Describe the homework assignment that will be done before the next session.

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Appendix D

Computer Coordinator Log Post-Implementation

Appendix D

Computer Coordinator Log - Post-Implementation

Week of Feb. 24-28	Helped Spanish teacher download and install Adobe acrobat	30 min.
	Restarted frozen computer in fifth grade classroom.	20 min.
	Total:	**50 min.**
Week of March 3-7	Reset the printer selector of the computer in the teachers' workroom.	10 min.
	Reinstalled the computer and printer in the prekindergarten classroom.	30 min.
	Total:	**40 min.**
Week of March 10-14	Unsuccessfully tried to restart the printer in the kindergarten classroom. Referred the problem to Bilbo Micro for resolution.	25 min.
	Total:	**25 min.**
Week of March 17-21	No problems reported	0 min.
	Total:	**0 min.**
Week of April 7-11	Replaced battery in second grade computer.	5 min.
	Total:	**5 min.**

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Appendix D

Computer Coordinator - Post-Implementation (continued)

Week of April 14-18	Diagnosed floppy disk drive problem in fourth grade.	10 min.
	Total:	**10 min.**
Week of April 21-25	Located lost file on hard disk for physical education teacher.	5 min.
	Total:	**5 min.**
Week of April 28 - May 2	Reset CD-rom port in second grade classroom.	10 min.
	Demonstrated the ink cartridge cleaning option of Claris Works to the fifth grade teacher.	5 min.
	Total:	**15 min.**
Week of May 5-9	Reset the dialing code of the library's computer. Problem was not resolved.	10 min.
	Total:	**10 min.**
Week of May 12-16	Diagnosed malfunctioning locked disk detector in teachers' lounge.	5 min.
	Reset printer in the kindergarten classroom.	5 min.
	Reconstructed desktop on the library's computer.	5 min.
	Total:	**15 min.**

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Appendix D

Computer Coordinator Log - Post-Implementation (continued)

Week of May 19-23	Tried to reset the audio source on LC III's that had Connectix Color Quickcams installed on them.	20 min.
	Total:	**20 min.**
Week of May 26-30	Changed batteries in both computers in the teachers' workroom.	5 min.
	Total:	**5 min.**

Average Time Spent Per Week From Feb. 24 to May 30 = 16.67 min.

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Appendix E

Individual Program Goals

Appendix E

Individual Program Goals

Name _____ Date _____

In what ways are you currently utilizing the school's computer equipment? You may list specific programs that you regularly use.

Please list several tasks or activities that you would like to be able to do as a result of your participation in this computer in-service program. You may list specific programs that you would like to learn about, or you can just list what jobs you want to be able to do, such as making a newsletter, communicating with friends via the Internet, etc. These goals may be related to your professional role as a teacher, or they may be more personal in nature. The choice is yours. It is important that your goals reflect something that is of interest to you.

Appendix F

Permission Release Form

Appendix F

Permission Release Form

I agree to participate in the 12-week computer in-service program that will be conducted by John Elwell during the 1996-97 academic year at the American School of Bilbao. I understand that I will be required to attend weekly lessons which will include group and individual computer instruction. As a participant, I will also be required to complete several assignments that my instructor and I will determine are necessary in order to demonstrate my mastery of the presented materials and skills. I agree to complete all instruments that will be used to evaluate my progress and the effectiveness of the program. I also understand that I may withdraw from the program at any point in time, without prejudice.

When the author prepares his final report, I give my permission for him to use information concerning all aspects of my participation in the program, though I understand that I will not be identified by name within that document.

Name _____ Date _____

Appendix G

Computer In-Service Program Evaluation

Appendix G

Computer In-Service Program Evaluation

Name _____ Date _____

What skills did you learn during this computer in-service program?

How are you using the skills that you have learned?

What features about the program did you like the best?

What features did you like the least?

How do you feel that the program could be improved?

Do you recommend that this program be used in the future? Why?

Additional Comments:

Appendix H

Frequency of Computer Survey Responses

Appendix H

Frequency of Computer Survey Responses

Pre-Implementation - Target Groups Only

	Item Number	Responses 1	2	3	4	5	
Attitude	1.	2	4	0	0	0	
	2.	0	2	1	1	2	*
	3.	0	1	3	1	1	
	4.	2	1	1	2	0	*
	5.	0	1	1	2	2	*
	6.	0	2	2	1	1	
Knowledge & Utilization	7.	5	3	3	4	0	
	8.	4	5	5	1	0	
	9.	0	7	3	2	3	*
	10	8	5	1	1	0	
	11.	0	3	7	3	2	*
	12.	6	3	4	2	0	
	13.	0	0	1	5	6	*
	14.	7	6	2	0	0	
	15.	2	4	5	4	0	
	16.	1	1	0	6	5	*
	17.	0	3	2	6	4	
	18.	1	4	2	4	4	
	19.	1	1	4	3	6	*
	20.	10	3	1	0	0	

* Indicates a negatively worded survey item.

Note: Some teachers did not respond to all items.

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Appendix H (continued)

Frequency of Computer Survey Responses

Post-Implementation - Target Groups Only

	Item Number	Responses 1	2	3	4	5	
Attitude	1.	0	1	3	1	0	
	2.	0	3	1	0	1	*
	3.	0	0	1	3	1	
	4.	4	1	0	0	0	*
	5.	0	1	0	3	1	*
	6.	0	1	2	1	1	
Knowledge & Utilization	7.	0	0	2	5	7	
	8.	0	0	5	6	3	
	9.	5	5	2	2	0	*
	10	1	0	3	3	7	
	11.	2	5	4	3	0	*
	12.	1	4	5	3	1	
	13.	0	4	4	5	0	*
	14.	0	4	5	5	0	
	15.	1	0	5	6	1	
	16.	0	1	5	3	0	*
	17.	0	0	0	6	8	
	18.	0	0	1	7	6	
	19.	1	8	1	4	0	*
	20.	2	3	3	2	4	

* Indicates a negatively worded survey item.

Note: Some teachers did not respond to all items.

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